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(54) **METHOD FOR IDENTIFYING MOVEABLE OBJECTS AND SYSTEM FOR CARRYING OUT SAID METHOD**

(57) The invention relates to the field of identification of various moveable objects during their travel. Each moveable object is furnished with an identifier, and at the routes of possible travel of said moveable objects a network of reading machines coupled by respective communication lines with at least one control point is formed. The technical result in the form of extension of functional possibilities is achieved owing to the steps of: storing the code sequences corresponding to the identifier of every moveable object in the memory of servers at control points, which sequences being supplemented with the information on this moveable object and its trav-

el route; and in the case of coinciding, in the server, the identifier read by any reading machine with one of the stored identifiers, supplementing this identifier with at least the address of the reading device and storing again the thus corrected identifier in the memory of the server. Simultaneously, the information, with which this identifier had been supplemented, is confronted with the information on a location of the reading device read this identifier; and in accordance with the result of this confrontation, deciding on the further travel of the moveable object having this identifier.

EP 1 501 063 A1

Description

Field of the Invention

[0001] The present invention relates to the method and system for identifying various moveable objects and particularly could be used in storage (in depots, in libraries, in shops), transport systems, etc.

Background of the Invention

[0002] Many various systems and methods for identifying moveable objects are known.

[0003] The method for identifying moveable objects (US 5640002 A, Int. Cl. G06K 7/10, 17.06.1997), where the moveable objects, for instance, goods in a shop are furnished with marks and bar codes which are read in cash-desks or depots, could be considered as the simplest one. However, this method does not permit to track intermediate routes of moveable objects.

[0004] Contrary to this, the method for identifying moveable objects in the GPS (Global Positioning System) allows to track permanently the moveable objects furnished with special mobile units for enabling the two-way communication with the point (US 6327533 B1, Int. Cl. H04Q 7/20, 04.12.2001). However, such a complex system employing a satellite communication is not always applicable: for example, its usage in mentioned shops seems to be problematic.

[0005] Known is the method for identifying moveable objects (US 2001/0055063 A1, Int. Cl. H04N 7/18, 27.12.2001), where the step of reading identifiers (or objects themselves) is carried out using video or television cameras arranged in predetermined places, and the step of processing images being obtained by those cameras allows to determine both object travels via these places, and the moveable objects themselves. This method cannot be considered as a simple, too.

[0006] One more method for identifying moveable objects (EP 0631259 A, Int. Cl. G07C 9/00, 28.12.1994) is realized using a system that permits to determine a location and to identify objects situated in different rooms and furnished with miniature electronic identification devices in the form of optical tags having the liquid-crystal "shutter" built into each tag. When irradiating the room with pulses of infrared light, these tags reflect the radiation opening their "shutters" in different time.

[0007] Known is the method for dynamic identifying various types of objects, realized in a system where a mobile electronic unit of code identification is placed at the object (RU 2152076 C1, Int. Cl. G07C 11/00, 27.06.2000). Synchronously with this mobile unit, the identical reference electronic unit of code identification works at a point, both units being initiated beginning from the same code sets, and their synchronization being performed in accordance with the electronic clock of universal time. Information on reference unit readings at a time is delivered by public information means so

that in order to identify an object it is sufficient to compare the mobile unit readings with the respective information on the reference unit. The disadvantage of this method and this system could be considered in the necessity of a complicated identifier comprising also, besides the code set generator and indicator, the synchronizer to universal time signals, as well as the power supply necessary for their autonomous operation at a moveable object.

[0008] In the similar method for identifying moveable objects (US 6324844 B1, Int. Cl. G08C 1/00, 29.01.2002) the identifiers mounted on these objects are rather simple units adapted for two-way communication with the reading machine. But nevertheless, the usage of system with such units requires both a two-way communication and common operation of at least two heterogeneous unit-identifiers.

[0009] The closest analogue to the method of the present invention is the method for identifying moveable objects, the method including steps of: furnishing each of moveable objects with an identifier capable to response, during its identification, by a unique signal sequence, and storing these unique signal sequences as corresponding identifiers in a memory of a control point; at the routes of possible travel of said moveable objects, forming a network of reading machines coupled by respective communication lines with at least one control point, each of said reading machines being intended for reading said identifiers of moveable objects; when passing the next reading machine by a specific moveable object, reading the identifier of this moveable object using this reading machine; transmitting over the communication line to the control point said unique signal sequence of the read identifier, as well as signals corresponding to the information on the location of the respective reading machine and on the time of reading this identifier (US 4288689 A, Int. Cl. G06K 7/00, 08.09.1981). The disadvantage of this method is in limited possibilities consisting in that this method permits only to read identifiers of moveable objects (particularly, the railway cars).

[0010] The closest analogue to the system of the present invention is the system for identifying moveable objects, the system comprising: identifiers, with each of which the corresponding moveable object is furnished; at least one reading machine installed at the route of possible travel of moveable objects and intended for reading the identifier of each moveable object; at least one server connected by respective communication lines with each of the reading machines and intended for storing at least identifiers; each reading machine comprises a reader intended for reading the identifier of the moveable object, and an address former intended for forming a signal sequence corresponding to the address of this reading machine; wherein the reading machine being capable to transmit the read identifier of the moveable object and at least the own address of the reading machine over the respective communication

line to the server (the mentioned US 4288689 A). The disadvantage of this system is in limited functional possibilities which are the same with the method.

Summary of the Invention

[0011] Thus, the problem of the present invention is in providing such a method for identifying moveable objects and such a system for carrying out said method, which would overcome the indicated disadvantages.

[0012] Accordingly, the technical result, to which the present invention is directed, is in extending the functional possibilities of the claimed method and system.

[0013] In order to achieve the indicated technical result, in a method for identifying moveable objects, the method including steps of: furnishing each of moveable objects with an identifier capable to response, during its identification, by a unique signal sequence, and storing these unique signal sequences as corresponding identifiers in a memory of a control point; at the routes of possible travel of said moveable objects, forming a network of reading machines coupled by respective communication lines with at least one control point, each of said reading machines being intended for reading said identifiers of moveable objects; when passing the next reading machine by a specific moveable object, reading the identifier of this moveable object using this reading machine; transmitting over the communication line to the control point said unique signal sequence of the read identifier, as well as signals corresponding to the information on the location of the respective reading machine and on the time of reading this identifier, - in accordance with the present invention, prior to the beginning of travel of given moveable object, supplementing its identifier in the memory of control point with an information defining this moveable object and its travel route; during the identification, comparing the unique signal sequence of the identifier of specific moveable object, which sequence being read by the specific reading machine and transmitted to the control point, with respective signal sequences stored in said memory; in the case, when the unique signal sequence of the read identifier coincides with one of the signal sequences stored in said memory, supplementing the identified signal sequence with at least signals corresponding to the information on the location of this reading machine and on the time of identification of this identifier, and storing the thus corrected signal sequence in said memory of the control point as a corrected identifier of this moveable object, which serves as a fact of identification of this moveable object; in accordance to the fact of identification, confronting the information which is stored in the memory of said control point and supplements the identifier of this moveable object, with the similar current information transmitted from the location of the reading machine, and on the result of this confrontation, deciding on the further travel of this moveable object.

[0014] One more feature of the method according to

the present invention is in that the information supplementing the identifier of the moveable object includes at least an information about characteristics of this moveable object and its destination point, and in the case, when the information on the location of the next reading machine coincides with the information about the destination point of the identified moveable object, transmitting to this location over the respective communication line from the control point a signal for terminating the travel of this moveable object.

[0015] Yet one more feature of the method according to the present invention is in that a way passed by a specific moveable object is determined at the control point based on the information on the locations of two reading machines passed successively by this moveable object and the distance known in advance between these locations.

[0016] Yet one more feature of the method according to the present invention is in that in the case of eliciting the impossibility for a specific moveable object to travel on the base of said confrontation of signals corresponding the information stored in the control point and the current information supplementing the identifier of the specific moveable object, blocking said correction of the signal sequence for a time period until the cause of said travel impossibility is eliminated.

[0017] Yet one more feature of the method according to the present invention is in that in the case of travel of several moveable objects as a single group, combining the signals of their identifiers into the respective sequence which is stored in the memory of corresponding control point, and when reading identifiers of this group, the identification is performed according to the identifier of one of moveable objects of this group.

[0018] In so doing, during the step of reading identifiers in said group of moveable objects, the number of moveable objects in this group could be counted up, and in the case, when detecting in the group the moveable object which identifier cannot be read, then the auxiliary signal of identifier absence is given to this moveable object, which auxiliary signal is transmitted to the control point instead of the unique signal sequence of unread identifier; at the control point, in the case, when the real number of moveable objects in the group does not coincide with the number of read identifiers and the auxiliary signal of identifier absence is present, replacing this auxiliary signal by the unique signal sequence of the absent identifier, elicited by comparing the signals of read identifiers in the group of moveable objects with the stored sequence of identifiers of this group.

[0019] Yet one more feature of the method according to the present invention is in sending periodically from every reading machine to the respective control point the diagnostic messages which content being taken into account when receiving signals of read identifiers.

[0020] At last, yet one more feature of the method according to the present invention is in displaying on a respective display of respective control point the informa-

tion on moveable objects with the identified identifiers and on the reading machines transmitted the read identifiers of these moveable objects.

[0021] In order to achieve the same technical result in a system for identifying moveable objects, the system comprising: identifiers, with each of which the corresponding moveable object is furnished; at least one reading machine installed at the route of possible travel of moveable objects and intended for reading the identifier of each moveable object; at least one server connected by respective communication lines with each of the reading machines and intended for storing at least identifiers; each reading machine comprises a reader intended for reading the identifier of the moveable object, and an address former intended for forming a signal sequence corresponding to the address of this reading machine; wherein the reading machine being capable to transmit the read identifier of the moveable object and at least the own address of the reading machine over the respective communication line to the server, - in accordance with the present invention, to each server is added at least one code sequence former intended to form a code signal sequence corresponding to the identifier with which every moveable object is furnished, and an information defining this moveable object and its travel route, and to transmit these code signal sequences to said server in order to store them as said identifiers; in so doing, the server is embodied with a capability: to compare the identifier read by the reading machine with the stored identifiers; in the case, when the pair of compared identifiers coincide, which defines the fact of identification, to supplement the information on the read identifier of the moveable object with the address of the reading machine transmitted this identifier, this address being used as the corrected identifier of this moveable object; to confront the stored code signal sequence of the identified identifier with a current code signal sequence transmitted from that reading machine which had performed the steps of reading and transmitting this identifier; and to decide on a further travel of the moveable object having this identifier.

[0022] One more feature of the system according to the present invention is in that the reading machine further comprises a timer intended to output the current time signal to the server in order to supplement the information on the read identifier of the moveable object.

[0023] Yet one more feature of the system according to the present invention is in that the server is embodied with a capability to sum up the way passed by the moveable object on the base of signals from respective reading machines passed successively by this moveable object, and the distance known in advance between the locations of these reading machines.

[0024] Yet one more feature of the system according to the present invention is in that every reading machine is supplemented with a moveable object counter and embodied with a capability to transmit signals from this moveable object counter to the server.

[0025] In so doing, the reading machine could be embodied with a capability to form and transmit to the server an auxiliary signal of identifier absence in the case, when the moveable object counter of this reading machine outputs a signal on the presence of a next moveable object which identifier is not read with the reader of this reading machine; and in the case, when several moveable objects are traveled as a single group, the server is embodied capable: to store the identifiers of this group of moveable objects in a respective sequence; to compare the number of moveable objects counted by any reading machine, which number is received over the communication lines, with the number of identifiers read when doing this; and in the case of lack of coincidence of those numbers and presence of the auxiliary signal of identifier absence, to replace this absent identifier by the corresponding identifier elicited from the step of comparing the read identifier sequence of specific group of moveable objects with the stored sequence of identifiers of this group.

[0026] At last, yet one more feature of the system according to the present invention is in that the server further comprises a moveable object location indicator intended to display the location of each of moveable objects; and the server is embodied with a capability to transmit the information on the moveable objects to said moveable object location indicator.

[0027] Information sources with data on the subject-matters for the same purpose and with the same features had not been elicited from the background, which indicates the novelty of these subject-matters.

[0028] In the background, known are information sources including data on some features of subject-matters according to the present invention. Thus, the formers of initial sequence are known from the PCT Application WO 93/25918 (Int. Cl. G01S 13/74, 23.12.1993). The server embodiment with a capability to correct the information stored in the server is known from the Russian Patent 2106689 (Int. Cl. G06K 17/00, 10.03.1998). However, the information sources including data on the whole of feature set of each subject-matter according to the present invention, as well as data or assumptions on the possibility to obtain the aforesaid technical result when utilizing the same feature sets, had not been elicited from the background. Therefore, the subject-matters of the present invention can be considered as having the inventive step.

Brief Description of Drawing

[0029] The invention is explained by the drawing where the schematic diagram of the system for implementing the method for identifying the moveable objects according to the present invention is shown.

The Detailed Description of Preferred Embodiments

[0030] The drawing shows the block diagram of the

system for implementing the method for identifying the moveable objects according to the present invention. This system consists of a control point 1 and reading machines 2 coupled with the control point 1 by means of respective communication lines 3. The drawing shows also a moveable object 4 with an identifier 5 placed at it. The arrow shows schematically that the object 4 is a moveable one. The object 4 could be, e.g., a transport means (particularly, the railway car, trailer, barge, etc.), a container at a storage, a book in a library, a tray at a conveyor, a good in a shop etc. Any device could be used as the identifier 5, if it ensures a response with a unique sequence of respective signals during the identification of this device. Examples of the identifier 5 could be found in all above mentioned information sources. This may be optical tags, radio and ultrasonic responders, active radio markers, contact sensors, etc.

[0031] Every reading machine 2 comprises a reader 6, an address former 7, and a timer 8. An embodiment of the reader 6 is defined by a specific type of the employed identifier 5. For instance, if the identifier 5 is a radio responder, then the reader 6 has an embodiment ensuring steps of supplying the interrogation signal to the identifier 5 and receiving the response signal from the identifier 5; if the identifier 5 is the optical label in the form of bar-code, then the reader 6 is embodied in the form of photosensor and, perhaps, illuminator with a narrow beam to illuminate the label. In the case, when the identifier 5 is embodied in the form of radioactive marker, then the reader 6 is a receiver of corresponding radiation.

[0032] The address former 7 serves as a peculiar identifier, and it sets an address of the reading machine 2. In general, the address former 7 is, for example, a generator tuned to generate a predetermined unique code combination given to only one reading machine 2. An embodiment of address former 7 could be any one, e.g., in the form of shift register having switchable feedbacks, or similarly to that shown in the mentioned US Patent 4288689.

[0033] The timer 8 is intended to form time signals, and could have any acceptable embodiment, for example, as in the mentioned Russian Patent 2152076.

[0034] The communication lines 3 are intended to transmit signals from the reading machine 2 to the control point 1. They could be wire lines, radio channels, laser beam, pneumatic rabbit, etc. The main purpose of the communication lines 3 is to timely deliver to the control point 1 the data on passing the specific reading machine 2 by either moveable object 4.

[0035] At the control point 1 are arranged a code signal sequence former 9, server 10, and moveable object location indicator 11. The moveable object location indicator 11 could be, e.g., a light annunciator, or monitor screen, or any other device capable to display the information on the moveable objects 4, particularly on passing the reading machine 2 by these objects.

[0036] The code sequence former 9 serves to form a

code signal sequence corresponding to the identifier 5 of the specific moveable object, supplemented with the information on characteristics of moveable object 4 and destination point of its travel. Such characteristics, e.g., for a railway car could be a carrying capacity, type, run after the previous repairs, station of registration, etc. The code sequence former 9 could be embodied as a table memory which input signals are data on identifiers and other specific characteristics of moveable objects 4 and travel routes, and output signals are corresponding code sequences.

[0037] The server 10 comprises a memory 12, a comparison unit 13, a decision unit 14, and an indicated information extractor 15. Units 13 to 15 could be realized in the form of separate hardware parts which embodiment will become clear from the following description of their operation, but, however, it is preferable to realize the whole server 10 on an accordingly programmed computer. The embodiment of the server 10 shown in the drawing serves only for illustration purpose and is not the subject-matter of patent claims according to the present invention. As well, the specific embodiments of other system parts are not included in the patent claim scope.

[0038] Every reading machine 2 could be supplemented with a moveable object counter 16 coupled to the server 10 at the control point 1 with a respective communication line 3. This counter 16 is intended to count up the number of moveable objects 4 and could have any acceptable embodiment, e.g., in the form of optical system which light beam is interrupted by a moveable object 4, or in the form of electromagnetic device. The reader 6 of reading machine 2 could be in this case embodied with a capability to form an auxiliary signal of identifier absence 5 in accordance to the fact of absence of response of identifier 5 when a next moveable object 4 passes the counter 16. This auxiliary signal must differ from a signal of any identifier 5 and from an address of any reading machine 2.

[0039] The method for identifying moveable objects according to the present invention is realized using the system shown in the drawing as follows.

[0040] First, a network of reading machines 2 at routes of possible travel of moveable objects 4 is formed. The reading machines 2 in this network are coupled with the control point 1 by respective communication lines 3.

[0041] Every moveable object 4 is furnished with the unique identifier 5 placed on the moveable object 4 so that it can be read by the reader 6 of any reading machine 2.

[0042] Prior to travel the specific moveable object 4, the original sequence former 9 at the control point 1 located in the travel start place forms the unique signal sequence which includes the signal sequence defining the identifier 5 of the moveable object 4, its characteristics and journey. The code signal sequence formed by the code sequence former 9, which sequence could rep-

resent all characteristics of the object 4, is stored in the memory 12 of the server 10.

[0043] The identifier 5 of this moveable object 4, read by the reader 6 of the reading machine 2.1, is transmitted to the server 10 over the communication line 3. Simultaneously, from the same reading machine 2.1 to the server 10 over the communication line 3 is transmitted the address of this reading machine 2.1, which address being formed by the address former 7 of this reading machine 2.1, and the reading time being generated by the timer 8 of this reading machine 2.1. All these signals come to the comparison unit 13 of the server 10.

[0044] The comparison unit 13 elicits the coincidence of the identifiers: one stored in the memory 12 and another read by the reading machine 2.1, which determines the fact of identification. Therefore, the decision unit 14 supplements the code sequence stored in the memory 12 with the signals corresponding to the address of the reading machine 2.1 and reading time, and sends the thus corrected signal sequence to the memory 12, where it is stored. A time period for storing the information written in the memory 12 must be not less than the time period which is necessary for this moveable object 4 to reach the destination.

[0045] During the travel, the specific moveable object 4 reaches the next reading machine 2.i installed at its travel route. The reading machine 2.i identifies the identifier 5 of this object 4 and transmits the unique code signal sequence to the server 10 at the control point 1 over the communication line 3, where this sequence comes to the comparison unit 13. From the memory 12 to the same comparison unit 13 come the identifiers stored in that memory 12, i.e., signal sequences corresponding to the identifiers 5 of moveable objects 4. The coincidence of the identifier read by the reading machine 2.i and transmitted over the communication line 3 with one of identifiers being stored in the memory 12 is considered as the identification.

[0046] In the case when such coincidence takes place, the decision unit 14 supplements the identified signal sequence determining the identifier 5 of this moveable object 4 with another sequence which is the address of reading machine 2.i from which the information has come just now and the reading time. The decision unit 14 replaces the information on the address of the previous reading machine 2.1 passed by the moveable object and on the time of previous reading with the newly come similar information from the reading machine 2.i. The thus corrected signal sequence is stored again in the memory 12 to the same address where the total information on the moveable object 4 was stored, which address being unequivocally defined by the unique identifier 5.

[0047] The extractor 15 of indicated information reads periodically from the memory 12 the information related to each identifier 5 and transmits it to the indicator 16 for visualization.

[0048] If the comparison unit 13 determines that,

when comparing the read and stored identifiers, the address of reading machine 2.i and the address of destination of moveable object 4 coincide, then the decision unit 14 outputs to the indicator 11 the signal (command) for terminating the further travel of this moveable object 4 and, perhaps, data on its further processing, for example, on unloading the car or putting the book on the necessary shelf.

[0049] Since the distances between reading machines 2 are known from the time of forming the network of reading machines, the system according to the present invention has a possibility to determine the total run of each moveable object 4. In order to do this, at every next reading, in accordance with addresses of previous and subsequent reading machines 2 passed by each moveable object 4, the known distance between those reading machines is supplemented to the formerly passed one, and thus the total run of every moveable object 4 is determined. If the code signal sequence formed by the code sequence former 9 is such that when its confronting with the stored characteristics of this moveable object 4 the impossibility to continue its travel is elicited, the decision unit 14 outputs to the indicator 14 the command for terminating the travel and blocks said correction of the signal sequence for a time period necessary to eliminate an obstacle. For instance, if an empty railway car is planned to be load with goods which weight exceeds the car carrying capacity, then the portion of code sequence representing the car carrying capacity is less than the goods' weight. In this case, the decision unit 14 outputs the command to the indicator 11 on inadmissibility of such operation and blocks the step of forming such a code sequence by the code sequence former 9. And only after elimination of the cause aroused the blocking, i.e., after selecting for this car the goods corresponding to its carrying capacity, the decision unit 14 removes the blocking and permits the original code sequence former 9 to form said sequence and send it to the memory 12 of server 10.

[0050] In the case, when the moveable objects 4 are combined into a group, the memory 12 of server 10 stores the signal sequence corresponding to the sequence of identifiers 5 of these moveable objects 4 in the group. When reading the identifiers 5 of this group of moveable objects 4 by the next reading machine 2.i, the identification of the whole group could be performed on identification of one or a portion of identifiers 5 of these moveable objects 4. Such a situation could arise, e.g., when railway cars are combined into a train, or when several books are selected for one reader in a library.

[0051] When traveling a group of moveable objects 4, due to a presence of the reader 16 of moveable objects 4 in a reading machine 2, a recovery of information on a specific moveable object 4 being a part of this group could be performed even in the case of failure of identifier 5 of this moveable object. In the case of lack of coincidence of the number of identifiers 5 read by the

reading machine 2 with the number of moveable objects 4 passed this reading machine, the decision unit 14 of server 10, when recognizing the auxiliary signal of absence of one identifier 5 instead of this identifier, will recover the information on this moveable object 4 according to the result of the previous reading stored in the memory 12.

[0052] The reading machines 2 could be equipped with diagnostic means in order to check the operating capacity of reader 6, address former 7, timer 8 and counter 16. Specific embodiment of these diagnostic means is determined by specific embodiment of these units and could be any one, if it only ensures a periodical output of diagnostic signals over the communication line 3. These signals coming to the server 10 of control point 1 makes the latter possible to fix an operation capability of each reading machine 2 and its elements in order to prevent a receiving of distorted information from a faulty reading machine 2 and to take measures on a reliable representation of travel state of moveable objects 4 in a failure conditions.

[0053] The proposed system for identifying moveable objects 4 could be also implemented in such a way that the indicators 11 are coupled not only with the server 10 of their own control point 1, but with servers 10 of other control points 1 over the respective communication lines (not shown). This ensures to widen the system capabilities for informing many operators on a travel of specific moveable objects 4.

[0054] Moreover, the indicated information extractor 15 of server 10 could have respective outputs to various actuators arranged at the routes of possible travel of moveable objects 4. Such actuators could be, e.g., railway automatic devices, or servos of conveyor lines, etc. In this case, the results of identification of moveable objects 4 will cause respective actions of necessary actuators for required changes of travel routes of specific moveable objects 4.

[0055] Thus, the method for identifying moveable objects and system for carrying out this method according to the present invention ensure an extension of functional possibilities, which allows to control the travel of great number of moveable objects with more flexibility.

Industrial Applicability

[0056] The present invention could be used for automation the operations in depots, in libraries, at transport, i.e., anywhere if there are objects moveable in a limited space, which characteristics could be changed in time.

[0057] Although the present invention was described using examples of specific embodiment, these examples have the illustrative function only and do not restrict the patent claim scope defined only by the accompanying claims.

Claims

1. A method for identifying moveable objects including steps of:

- furnishing each of moveable objects with an identifier capable to response by a unique signal sequence during its identification, and storing these unique signal sequences as corresponding identifiers in a memory of a control point;
- at the routes of possible travel of said moveable objects, forming a network of reading machines coupled by respective communication lines with at least one control point, each of said reading machines being intended for reading said identifiers of moveable objects;
- when passing the next reading machine by a specific moveable object, reading the identifier of this moveable object using this reading machine;
- transmitting over the communication line to the control point said unique signal sequence of the read identifier, as well as signals corresponding to the information on the location of the respective reading machine and on the time of reading this identifier;

characterizing in that:

- prior to the beginning of travel of given moveable object, supplementing its identifier in the memory of control point with an information defining this moveable object and its travel route;
- during the identification, comparing the unique signal sequence of the identifier of specific moveable object, which sequence being read by the specific reading machine and transmitted to the control point, with respective signal sequences stored in said memory;
- in the case, when the unique signal sequence of the read identifier coincides with one of the signal sequences stored in said memory, supplementing the identified signal sequence with at least signals corresponding to the information on the location of this reading machine and on the time of identification of this identifier, and storing the thus corrected signal sequence in said memory of the control point as a corrected identifier of this moveable object, which serves as a fact of identification of this moveable object;
- in accordance to the fact of identification, confronting the information which is stored in the memory of said control point and supplements the identifier of this moveable object, with the similar current information transmitted from the location of the reading machine, and on the re-

sult of this confrontation, deciding on the further travel of this moveable object.

2. The method according to Claim 1, **characterizing in that** the information supplementing the identifier of the moveable object includes at least an information about characteristics of this moveable object and its destination point, wherein in the case, when the information on the location of the next reading machine coincides with the information about the destination point of the identified moveable object, transmitting a signal for terminating to this location over the respective communication line from the control point a signal for terminating the travel of this moveable object.

3. The method according to Claim 1, **characterizing in that** a way passed by a specific moveable object is determined at the control point on the base of the information on the locations of two reading machines passed successively by this moveable object and the distance known in advance between these locations.

4. The method according to Claim 1, **characterizing in that** in the case of eliciting the impossibility for a specific moveable object to travel on the base of said confrontation of signals corresponding the information stored in the control point and the current information supplementing the identifier of the specific moveable object, blocking said correction of the signal sequence for a time period until the cause of said travel impossibility is eliminated.

5. The method according to Claim 1, **characterizing in that** in the case of travel of several moveable objects as a single group, combining the signals of their identifiers into the respective sequence which is stored in the memory of corresponding control point, and when reading identifiers of this group, the identification is performed according to the identifier of one of moveable objects of this group.

6. The method according to Claim 5, **characterizing in that** during the step of reading identifiers in said group of moveable objects, the number of moveable objects in this group is counted up, and in the case, when detecting in the group the moveable object which identifier cannot be read, then giving to this moveable object the auxiliary signal of identifier absence, which auxiliary signal is transmitted to the control point instead of the unique signal sequence of unread identifier; at the control point, in the case, when the real number of moveable objects in the group does not coincide with the number of read identifiers and the auxiliary signal of identifier absence is present, replacing this auxiliary signal by the unique signal sequence of the absent identifier,

elicited by comparing the signals of read identifiers in the group of moveable objects with the stored sequence of identifiers of this group.

7. The method according to Claim 1, **characterizing in that** the method further includes a step of sending periodically from every reading machine to the respective control point the diagnostic messages which content being taken into account when receiving signals of read identifiers.

8. The method according to any of preceding Claims, **characterizing in that** the method further includes a step of displaying on a respective display of respective control point the information on moveable objects with the identified identifiers and on the reading machines transmitted the read identifiers of these moveable objects.

9. A system for identifying moveable objects, the system comprising:

- identifiers, with each of which the corresponding moveable object is furnished;
- at least one reading machine installed at a route of possible travel of the moveable objects and intended for reading the identifier of each moveable object;
- at least one server connected by respective communication lines with each of the reading machines and intended for storing at least identifiers;
- wherein each reading machine comprises:
 - a reader intended for reading the identifier of the moveable object, and
 - an address former intended for forming a signal sequence corresponding to the address of this reading machine;
 - wherein the reading machine being capable to transmit the read identifier of moveable object and at least the own address of the reading machine over the respective communication line to the server;

characterized in that:

- to each server is added at least one code sequence former intended to form a code signal sequence corresponding to the identifier with which every moveable object is furnished, and an information defining this moveable object and its travel route, and to transmit these code signal sequences to said server in order to store them as said identifiers;
- in so doing, the server is embodied with a capability: to compare the identifier read by the reading machine with the stored identifiers; in

the case, when the pair of compared identifiers coincide, which defines the fact of identification, to supplement the information on the read identifier of moveable object with the address of the reading machine transmitted this identifier, this address being used as the corrected identifier of this moveable object; to confront the stored code signal sequence of the identified identifier with a current code signal sequence transmitted from the reading machine which had performed the steps of reading and transmitting this identifier; and to decide on a further travel of the moveable object having this identifier.

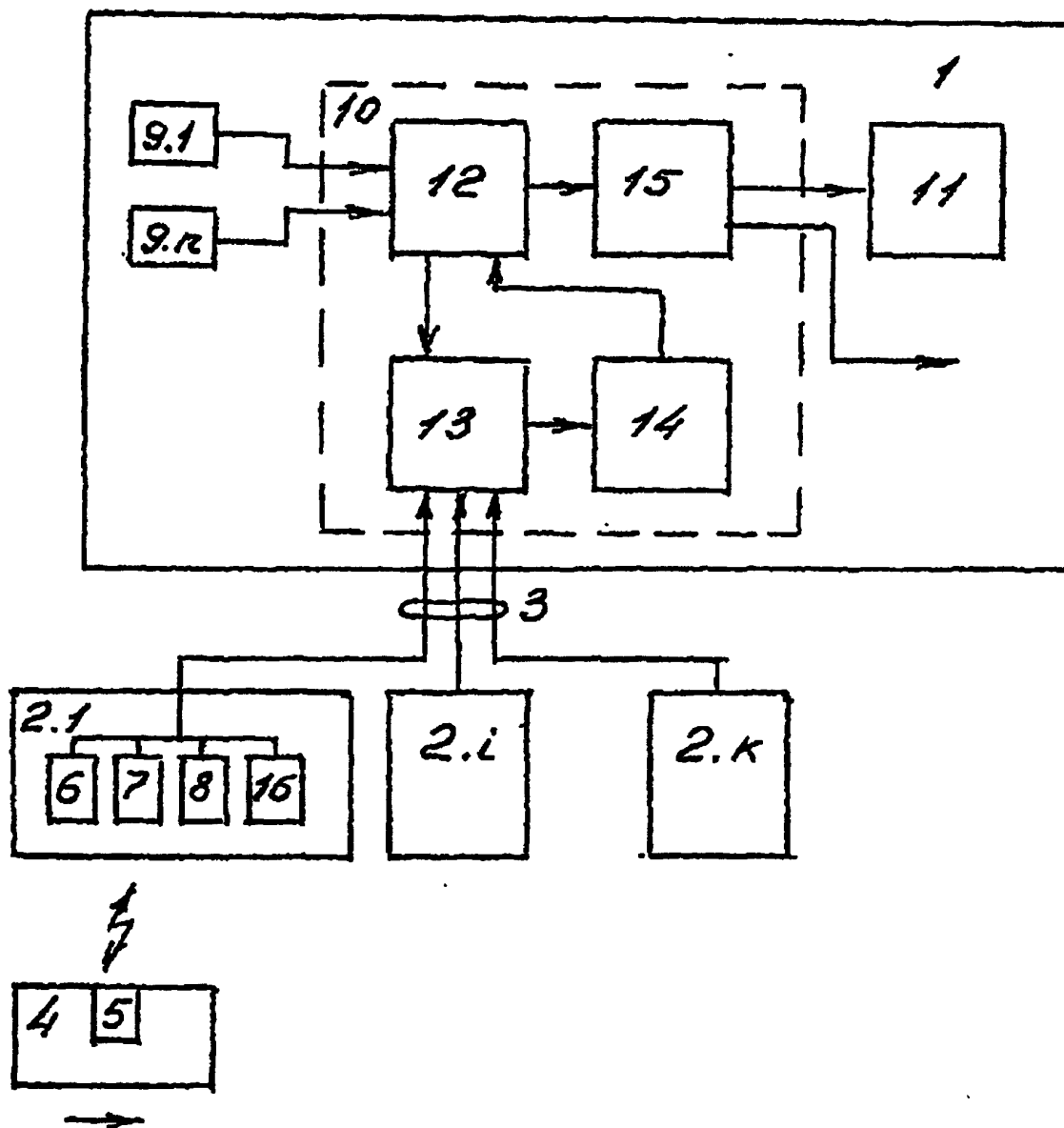
10. The system according to Claim 9, **characterized in that** the reading machine further comprises a timer intended to output the current time signal to the server in order to supplement the information on the read identifier of moveable object.

11. The system according to Claim 9, **characterized in that** the server is embodied with a capability to sum up the way passed by the moveable object on the base of the signals from respective reading machines passed successively by this moveable object, and the distance known in advance between the locations of these reading machines.

12. The system according to Claim 9, **characterized in that** every reading machine is supplemented with a moveable object counter and embodied with a capability to transmit signals from this moveable object counter to the server.

13. The system according to Claim 12, **characterized in that** the reading machine is embodied with a capability to form and transmit to the server an auxiliary signal of identifier absence in the case, when the moveable object counter of this reading machine outputs a signal on the presence of next moveable object which identifier is not read with the reader of this reading machine; and in the case, when several moveable objects are traveled as a single group, the server is embodied with a capability: to store the identifiers of this group of moveable objects in a respective sequence; to compare the number of moveable objects counted by any reading machine, which number is received over the communication lines, with the number of identifiers read when doing this; and in the case of lack of coincidence of those numbers and presence of the auxiliary signal of identifier absence, to replace this absent identifier by the corresponding identifier elicited from the step of comparing the read identifier sequence of specific group of moveable objects with the stored sequence of identifiers of this group.

14. The system according to Claim 9, **characterized in that** the server further comprises a moveable object location indicator intended to display the location of each of moveable objects; and the server is embodied with a capability to transmit the information on the moveable objects to said moveable object location indicator.



INTERNATIONAL SEARCH REPORT

International application No.

EA 02/00012

A. CLASSIFICATION OF SUBJECT MATTER G08G 1/017, G09F 3/00 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) G06F 17/00, G08G 1/01, 1/017, 1/123, G01S 5/00, G09F 3/00, 3/02, B65G 47/00, 47/34, 47/46, Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	RU 2144221 C1 (GOSUDARSTVENNOE UNITARNOE PREDPRIATIE GOSUDARSTVENNY HAUCHNO-ISSLEDOBATELSKY INSTITUT AVIATIONNYKH SISTEM) 10.01.2000	1-14
A	RU 2127702 C1 (DZHERVIS B. YEBB INTERNESHNL KOMPANI) 20.03.1999	1-14
A	EP 0509777 A2 (PIONEER ELECTRONIC CORPORATION) 21.10.1992	9-14
A	GB 2025185 A (SIEMENS AKTIENGESELLSCHAFT) 16 Jan 1980	1-14
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 06 Mars 2003 (06.03.2003)		Date of mailing of the international search report 27 Mars 2003 (27.03.2003)
Name and mailing address of the ISA/		Authorized officer
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